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a tiny puppy. The ears are simple, round holes, without a conch, and the eyeballs are barely half a millimetre in diameter. Another species, *H. glaber*, was described by Rüppell forty years ago. It is a burrower, the skin passing across the mouth inside the incisors.

EMBRYOLOGY.[1]

Suggestion respecting the Epiblastic Origin of the Segmental Duct.—In a recent paper[2] with the above title, Prof. A. C. Haddon, of Dublin, offers a very suggestive explanation of the origin of the paired parallel segmental ducts of vertebrates from lateral, longitudinal grooves in some primitive, ancestral form, these grooves finally closing so as to form lateral ducts, which, at last, became confluent posteriorly with the cloaca.

Professor Haddon cites Hensen, Spee, and Flemming as having observed the origin of the segmental ducts from the epiblast in the rabbit and guinea-pig. Later (1886), Dr. Van Wijhe found the same to be the case in *Raia clavata*, and afterwards Dr. Perényi observed the same mode of development to obtain in *Rana esculenta* and *Lacerta viridis*.[3]

"The origin of the segmental duct from the epiblast being now known to occur in Elasmobranchs, Anura, and Rodents, we are justified in assuming that this is a general and probably primitive mode of formation. With the above-mentioned exceptions, all embryologists who have recorded observations on the development of the duct agree in stating that it is at first placed immediately below the epiblast, and that it gradually sinks within the mesoblast until it comes to lie close to the peritoneal epithelium; they also all agree in deriving the duct from the somatic mesoblast.

"The duct arises, in the Rodents, as a linear proliferation of the epiblast, in the region opposite to the intermediate cell-mass ('*Grenzstrang*' of Hensen). Flemming points out that the area is of variable length, not even being symmetrical. The separation of this solid cord of cells from the epiblast takes place from before backwards, and first occurs at a time when the mesoblastic somites are still entirely continuous with the ventral (somatic and splanchnic) mesoblast. Hensen, Spee, and Flemming conjectured that the primitive kidney is itself developed from the epiblast in these mammals; but of this they produce no direct evidence. It is more probable that the nephridia are of mesoblastic origin, as in other vertebrates.

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[1] Edited by Prof. JOHN A. RYDER, Biological Department, University of Pennsylvania, Philadelphia.

[2] The Scientific Proceedings of the Royal Dublin Society, v., pt. vi., 1887, pp. 463–472, pl. x.

[3] [The editor would here, for the first time, record the fact that he has found the anterior ends of the segmental ducts intimately connected with the epiblast in young embryos of the catfish (*Amiurus albidus*), so that the mode of origin of the segmental duct spoken of above very probably applies also to the Teleostei.]

"Van Wijhe finds that in the ray the pronephros (*Vorneire*) arises at the commencement of Balfour's stage I., as a continuous evagination from the somatopleure on each side of the body throughout five somites. When the hinder end of this evagination reaches the skin it fuses therewith, and the place of fusion is the rudiment of the duct of the pronephros (segmental duct). This grows posteriorly, gradually separating from the skin, so that its latest-formed end is always fused with it. The mesonephros (*Urniere*) is developed shortly after the appearance of the pronephros.

"In the frog Perényi finds that the duct develops as a canal-like separation from the inner (nervous) cell-layer of the epiblast, which later associates itself with the mesoderm cells of the intermediate cell-mass (*Grenzstrang*).

"According to the usually-received account, formation of the segmental duct may take place in two ways,—(1) either by the closing in of a continuous groove of the somatic peritoneal epithelium (Cyclostomi, anterior end only; Lepidosteus, Teleostei, Amphibia); or as a solid knob or rod of cells derived from the somatic mesoblast, which grows backwards between the epiblast and the mesoblast (Cyclostomi, posterior portion; Elasmobranchii, Amniota)."

At this point Professor Haddon further cites the literature, giving especial prominence to the views of Balfour on this difficult problem as discussed in his "Comparative Embryology," vol. ii. He then refers at length to the view propounded by Sedgwick in his well-known memoir, "On the Origin of Metameric Segmentation," and cites Lang, who says, "In certain Polyclades [Turbellaria] ramifications of the intestine open to the exterior by excretory pores, either on the dorsal surface (*Planaria aurantiaca* d. Ch.), or on the lateral edge (as in a very interesting new genus of the family of Proceridæ), thus forming a complete analogy with the excretory pores which are found at the edge of the bell in certain Medusæ.

"The aquiferous system characteristic of other Platy-elminthes does not occur in the Polyclades. The secretory organs of these animals are formed after the type of those of the Cœlenterata. Excretion in the two groups is performed by means of diverticula from the intestine which open to the exterior."

Van Wijhe's view is briefly summarized to the effect that the primitive Craniota had no pronephric duct, the pronephros opening outwards by a pore from the gland. Later, this orifice migrated backward and its outer border developed into the duct, and, approaching the cloaca, blended with and opened into it. He also thinks that the epiblastic origin of the segmental duct will not be welcome to those who think that the Chordata were descended from Annelids; but, for his part, he cannot admit the relationship between these types.

Professor Haddon then states his own view, as follows: "Without at all committing myself to a belief in the ancestry of the Chordata from Chætopod worms, I would offer the following considerations as tending to show that the vertebrate excretory system is readily comparable with that of Annelids, now that the epiblastic origin of the segmental duct has been established.

"It is perfectly well known that the nephridia of all invertebrates open directly to the exterior, and in the segmental worms there are typically a pair of nephridia for each somite.

"It is generally admitted that the early (not necessarily the *primitive*) Chordata were segmented, and it is not unreasonable to suppose that the nephridia were segmentally disposed, as there is usually a marked segmental arrangement of the nephric tubules in ontology. The peripheral orifices of the nephridia must either have opened directly to the exterior or from the first debouched into a longitudinal canal. Various theories have been framed to explain the latter arrangement, but the former condition is undoubtedly more easily conceived, one difficulty in this supposition being,—What has become of the primitive external openings?

"Accepting the proposition that in the primitive Chordata nephridia opened directly to the exterior, we have only to assume that the lateral area along which they opened was grooved, and that this groove extended posteriorly as far as the anus.

"From the analogy of the neural groove there is no great difficulty in further supposing that the nephric groove was converted into a canal, which, becoming separated from the overlying epiblast, might sink into the deeper-lying parts of the body.

"If a suggestion may be hazarded concerning the advantage of converting the nephric groove into the nephric duct, it may be pointed out that the lateral openings of the nephridia would not be far removed from the branchial clefts, and the need of pure water for respiratory purposes is emphasized by the now acknowledged fact that each cleft was provided with its own sense-organ (now metamorphosed into the 'thymus gland'). The development of the duct from before backward supports this view.

"From recent researches on the lamprey (Shipley), newt (Alice Johnson), Alytes (Gasser), and frog (Spencer), it has been proved that in these forms the blastopore never closes up, but persists as the anus (*i.e.*, the opening of the mesenteron into the cloaca).

"We are justified in assuming the persistence of the blastopore as the anus in early Chordata; thus, if the nephric groove were continued round to the anus it would practically open into the extreme hinder end of the mesenteron,—in other words, into the urodæum (Gadow).

"Probably about the same time that the nephric groove was being converted into the nephric canal (segmental duct) the proctodæum was being invaginated. The latter would push before it the posterior orifice of the nephric canal.

"The nephridia themselves appear to be of mesoblastic origin. It is possible that the *Archinephros* extended throughout the greater length of the body, as in Chætopod worms, but that in time an anterior section (pronephros) came to be developed earlier than the posterior portion (mesonephros).

"The precociousness in the development of the segmental duct in ontogeny is not necessarily a difficulty, as it can be paralleled by many other organs.

"On the hypothesis just sketched out the nephridia always open by their original epiblastic pores,—primitively, directly to the exterior; secondarily, into a canal separated from the epiblast: also the archinephros could be equally effectively functional throughout the whole period of its modification."

ANTHROPOLOGY.

Folk-Lore.—No other branch of anthropology is making more rapid progress than Folk-Lore, "or the popular explanation of observed facts and the customs arising therefrom." Sir R. C. Temple is the last to develop a scheme of the subject, on the spirit basis, as applicable to India. It is so comprehensive that it is given below in full, and may be easily adapted to any area:

SPIRIT BASIS OF BELIEF AND CUSTOM.

I. RELIGION.

A. Spirit-Worship.

- Ancestor-worship.
- Ancestors become guardians.
  - Spirits as guardians.
  - Badges or Devaks.
- Spirits are mortals.
- Spirits cause disease.
  - Effects of this belief.
  - Ornaments intended to scare spirits.

Articles which scare spirits:

Fire,
Water,
Metal,
Urine,
Arches,
Ashes,
Beating,
Bells,
Blood,
Bread,
Breath,
Brooms,
Canes,
Circles,
Clothes,
Colors,
Coral,
Cross,
Crown,
Dancing,